

CLAIMS

WHAT IS CLAIMED IS:

1. An electrodeionization device comprising: an anion exchange membrane; a cation exchange membrane; a first electrode; at least one membrane bag formed by the anion exchange membrane and the cation exchange membrane; a second electrode; said at least one membrane bag having a concentrate flow channel; a dilute flow channel located adjacent said at least one membrane bag, said at least one membrane bag and said dilute flow channel forming an inner module having a first end and a second end opposite the first end; a first insert of filter material arranged at the first end of said inner module; a second insert of filter material arranged at the second end of said inner module, said first and second inserts of filter material arranged to allow water to flow through while inhibiting resin from flowing through; and a housing for the foregoing components.

2. The device of Claim 1, further comprising a first filter plate adjacent said first insert of filter material opposite said inner module, said first filter plate arranged to fix said first insert of filter material against said inner module.

3. The device of Claim 2, further comprising a second filter plate adjacent said second insert of filter material opposite said inner module, said second filter plate arranged to fix said second insert of filter material against said inner module.

4. The device of Claim 3, said first and second filter plates having apertures through the plates for allowing water to pass through the plates.

5. The device of Claim 1, wherein said second electrode comprises a metal strip or metal wire forming a conductive crust.

6. The device of Claim 1 wherein said first electrode is said axially extending conduit.

7. The device of Claim 6 wherein said axially extending conduit is a metal pipe centrally extending within said housing.

8. The device of Claim 1, further comprising a cathode linked with said first electrode and an anode linked with said second electrode.

9. The device of Claim 1 wherein said at least one membrane bag is at least one set of membrane bags formed by positioning an interface between the anion exchange membrane and the cation exchange membrane.

10. The device of Claim 1, wherein the first and second inserts of filter material include layers of material formed from an alkene polymer with microscopic channels of even distribution throughout the layers.

11. The device of Claim 10, wherein the first and second inserts of filter material are wheel shaped having a central aperture arranged to fit around said axially extending conduit and within said housing.

12. The device of Claim 1, wherein the electrodeionization device is spiral wound to form a helical electrodeionization device, and further comprising an axially extending conduit generally located along a central axis of the helical electrodeionization device.

13. The device of Claim 12, wherein said at least one membrane bag and said dilute flow channel are wound about said axially extending conduit, and said dilute flow channel is positioned between wound layers of said at least one wound membrane bag.

14. The device of Claim 12, wherein said second electrode is a metal member extending about the outside of said inner module.

15. The device of Claim 12, wherein said axially extending conduit is a pipe having slotted apertures arranged to communicate fluid with said concentrate flow channel.

16. The device of Claim 12, wherein said axially extending conduit includes said first electrode.